STATEMENT OF WORK

DELIVERY ORDER NO 17
CONTRACT NO. I-ACW43-96-D-0525
MACDILL AIR FORCE BASE
AERIAL PHOTOGRAPHY AND MAPPING
U.S. ARMY CORPS OF ENGINEERS

DESCRIPTION OF WORK:

The mapping of MacDill Air Force Base and surrounding areas near Tampa, Florida, as indicated on maps previously furnished, has been requested by the United States Air Force. The project consists of flying and producing color infrared aerial photos (1" = 2400' negative scale) and digital orthophotos at 1" = 400' horizontal scale of the main base and accident potential zones (approximately 7930 acre area). Natural color aerial photography (1" = 300' negative scale) of approximately 5,750 acres of the base including the 2360-acre cantonment area as defined on maps previously provided will be acquired. Required ground control will be established for both flights. The ground control for the color infrared photography will support 1" = 400' horizontal scale digital orthophotos. The ground control for the color photography will support 1" = 50' horizontal scale with 1' contours. From the color infrared 1" = 2400' negative scale photography, orthophotos will be produced at 1" = 400' horizontal map scale **(No topo or planimetric data will be collected).** Color 1" = 300' negative scale aerial photography of the entire 2,360 acre cantonment area as defined on maps previously furnished along with required ground control will be used to generate 1" = 50' horizontal color orthophotos with 1' contours and full planimetric detail. In addition aerotriangulation procedures will be performed on the entire 1" = 300' negative scale color photography for future mapping.
Aerotriangulation (AT) will be performed on all photography required for mapping (1" = 2400' and 1" = 300' negative scales). Digital elevation models (DEM) will be generated utilizing mass points and break lines for the development of orthophotos, planimetric and topographic mapping as described above.

Final mapping products will fully comply with ASPRS Class I Standards for production of orthophotos and digital mapping at the scales, contour intervals, and resolutions listed above.

In addition, several existing digital map layers representing installation managed and maintained on and off base facilities will be added to the final digital mapping data.

2. Information supplied by the Government:

a. Map showing project areas and approximate location of the check profile

b. Existing MacDill Air Force Base (AFB) installation managed and maintained facilities map data in Intergraph Format on 3.5" diskettes

WORK TO BE PERFORMED BY THE CONTRACTOR:

Contractor shall provide equipment, supplies, facilities, and personnel to accomplish the following work:

a. Contractor will establish a ground survey control network and obtain natural color aerial photography of the 5,750acre main base area at a negative scale suitable for producing digital mapping and orthophotography of planimetric and topographic data at a map scale of 1" = 50' with 1' contour intervals, contractor will also establish a ground survey control network and obtain color infrared photographs of the 7,930 acre area that includes MacDill AFB and the two accident potential zones at a negative scale 1" = 2400' suitable for producing digital orthophoto mapping at a horizontal scale of 1" = 400'. The plan for ground survey control required for mapping and procedures to accomplish the ground survey control will be submitted to CELMS-ED-HG for approval before initiation of the project. All original notes for these surveys shall be submitted and the contractor shall make no copies. **All survey data shall be in the Universal Transverse Mercator (UTM) System, and shall be referenced to** NAD 83. All surveys shall be accomplished in accordance with the technical section of Contract DACW43-96-D-0525.

b. Additional ground survey data will be collected to check the final mapping. **One check profile will be obtained within the 1" = 50' horizontal cantonment mapping area. The check profile will be approximately 1000' in length with an elevation established every 100'. The approximate location of the check profile is shown on previously furnished maps. The check profile data will be checked by the contractor in the field and mailed directly. No copies are to be made and no information regarding the profile is to be given to the mapping staff.**

c. Two sets of natural color prints will be made in accordance with the technical section of Contract DACW43-96-D-0526. One set of the prints will be used as control photos for orthophoto and map production. The control prints will have all ground control marked on the back and front of each photo. All photography will include in the border areas the GPS latitude/longitude, the negative scale (as a ratio), the dates of photography, flight line and frame numbers and the title "MacDill AFB."

d. Utilizing ground control (panel data and photo identifiable data) perform analytical aerotriangulation to generate sufficient photo control points to accomplish ASPRS Class I Mapping for all orthophotography and mapping at the horizontal scales listed above.

e. Natural color diapositives will be prepared for aerotriangulation procedures and mapping. Digital orthophoto mapping areas will require two sets of diapositive. One set will be for aerotriangulation and one

set for orthophoto scanning and production. Simultaneously along with the aerotriangulation analytical diapositives, orthophoto diapositives will be prepared and control transferred to them for digital orthophoto rectification and aerotriangulation.

Prior to transfer, diapositives will be checked for scratches, blemishes, or other abnormal markings. Unacceptable diapositives will be attached to a quality check form indicating the location and type of abnormality and will be returned to the photographic laboratory.

f. Utilizing the color infrared 1" = 2400' negative scale photography develop digital elevation models, scan all required photography required for orthophoto mapping. The 1" = 2400' negative scale area shall be scanned at a pixel resolution that will provide orthophotos with a 2 ft ground pixel resolution.

The contractor will develop Digital Elevation Models (DEM's) for digital ortho-rectification. The following procedure will be used:

DEM data will be captured using analytical stereo data capture systems by means of single point elevations (X, Y and Z). NO BREAKLINES. DEM data will be collected for each map sheet and on completion of each area, all data will be merged into one data set. The data set will then be processed and the DEM reviewed and edited for completeness and correctness.

Checked and approved orthophoto diapositives will be scanned.

Digital imagery will be set up and oriented on a softcopy workstation. As a quality control check the following will be performed before ortho-rectification:

Each fiducial mark will be visited with the system cursor to obtain its sample/line location in the image. The RMSE of the fiducial will be calculated and examined for accuracy. RMSE for each control point used in the resection will be reported. Any unacceptable RMSE will be discarded.

The newly resectioned image will be visually checked for pixel drop out and/or other artifacts, which may degrade the final orthophoto image.

DEM will be in ASCII format and will be checked to verify that each point or break line has a feature code. The coordinate/projection system will also be verified at this stage in the process.

Scaled and hillshade DEM images will be inspected for missing or poor data.

Rectification of all required imagery will be performed and checked. All control panels or photo identifiable points visible will be visited on the screen and the X and Y of the location will be displayed. This information will be checked against the ground survey data. Visual checks of the image quality will be performed. Radiometric variation will be checked with image histogram analysis including linear contrast stretch, user selected contrast stretch, histogram normalization and histogram clipping.

g. Produce color infrared digital orthophotos of MacDill Air Force Base (7930 acre area) at 1" = 400' horizontal scale and
deliver the data in Intergraph and Autocadd version 13 compatible formats on CD-ROM.

h. The contract shall utilize the 1" = 300' negative scale photography and associated ground control and produce 1" = 50' horizontal scale color orthophotos with full planimetric detail and 1' contour interval mapping of the 2,360 acre cantonment area as defined on maps previously furnished. Mapping data shall be delivered in Intergraph and Autocadd version 13 compatible formats on CD-ROM.

i. The contractor shall incorporate existing government furnished digital installation facilities mapping layers into a the mapping data base and developing a "Primary Installation" orthophoto map at 1"=400' horizontal scale. The existing map layers needed to complete the "Primary Installation" mapping are
on 8mm tape in Intergraph format and are complete and accurate in their coverage. The map development shall be accomplished by creating separate layers for each data sets provided and warping the data sets to "best fit" the 1" = 400' horizontal orthophoto mapping data. The contractor shall then produce one set of mylar orthophoto map sheets at 1" = 400' horizontal scale with the following vector layers overlaying the orthophoto image.

- Property Lines
- Record Flood Contour
- Quantity-Distance explosive safety zone area encompassing all explosive locations
- Alert parking areas
- Existing Facilities tie. Airfields pavements, structures above ground, structures below ground, streets, parking areas, railroads, fuel hydrant outlets, antennas

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-Type of construction
Address System and building numbers (base numbering system)

- Grid coordinate system
- Off base streets contiguous to the base
- Identification of streets and roads
- The length, width, true bearing, directional numerals, lateral clearances, clear zones, approach zones, and center lines of each runway
- Arresting barriers and type
- Taxiways identified by number or letter
- The designation of the instrument runway
- Special areas. e.g., recreational, drop zones, fire training, designated training areas for mobility exercises, etc
- Aircraft maintenance light poles or towers, blast deflectors, and aircraft fueling/defueling outlets.
- Helicopter landing areas and clearances applicable for same

j. Provide a total of forty (40) hours of training, for a minimum of two individuals, at MacDill Air Force Base, utilizing existing hardware and software, in the manipulation of the digital orthophotos, contours, and planimetric data being provided under this delivery order

DELIVERY ITEMS:

a. Computer printout copy of aerotriangulation solution. Aerotriangulation report as defined in 3.c

b. Copy of each stereo model orientation report

c. Six copies of the digital orthophoto file along with planimetric and topograph map files at the horizontal scales listed above on CD-ROM in Intergraph and Autocadd version 13 readable format

d. One set of the "Primary Installation" maps at 1" = 400' horizontal scale on mylar and six copies in Intergraph and Autocadd version 13 readable formats on CD-ROM

e. All survey data (including ground surveys), including survey information developed and or collected for the project and all check profile data

f. Flight line index for the project on paper maps indicating the flight lines, beginning, and ending frames for each flight line along with altitude and negative scale of the photography

g. Return all manuscript copies, horizontal & vertical control information, aerial photographs, diapositives, and aerial film to the government when the project is completed

SCHEDULE AND SUBMITTAL:

a. The contractor will deliver the 1" = 400' "Primary Installation" map data as specified in paragraph by April 30, 1997. The contractor will deliver all remai~ fina :997 products including CD-ROM digital data files by:

b. All material to be furnished by the contractor shall be delivered at the Contractors expense to: U.S. ARMY CORPS OF ENGINEERS, ST. LOUIS DISTRICT, 1222 SPRUCE STREET, ST. LOUIS, MO., 63103-2833

TIME EXTENSIONS:

In the event, these schedules are exceeded due to causes beyond the control and without fault or negligence of the contractor, this delivery order will be modified in writing and the delivery order completion date will be extended one calendar day for each calendar day of delay.